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Formulating the Competence of the Future Computer Science Teacher in Programming and Prepare Them for Using of Digital Technologies

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Abstract: This article deals with the formation of professional ICT competence of future teachers of computer science and in the study of programming. The technique of effective teaching of programming for the creation of electronic learning resources is presented. Several examples are given in C++, Python, and Delphi programming languages.

Keywords: informatics; computer science; programming training; competence; special competencies of computer science teachers.

Preparation of future qualified Informatics teachers in the educational process of pedagogical universities is one of the topical and complex issues. The actions carried out in the system of higher and general secondary education in the Republic and the current state-of-the-art information society require drastic changes in this area.

In the decree of the president of the Republic of Uzbekistan № PF-5847 of 2019 "on approval of the concept of development of the higher education system of the Republic of Uzbekistan up to 2030" to determine the priority directions of systematic reform of Higher Education, to raise the qualitatively new level of the process of training of highly qualified personnel, in order to develop the social sphere and economic sectors based on advanced educational technologies," has defined a number of tasks [1].

It is necessary to focus the competence of the future computer science teacher on programming languages not only on the acquisition of basic knowledge and skills in the field of programming languages, but also on the creation of a small amount of datures in the practical nature of himself and the reader to whom he teaches. Also, the competence is required to constantly enrich the knowledge of the specialty, to learn new information, to understand important social requirements, to look for new information, to be able to process them and apply them in their activities. The teacher relies on his knowledge and potential to create software products for the world of knowledge and to create his first ever uncomplicated products for the creation of digital technologies. Digital technologies make it easier for the educator to receive education by creating modern conveniences. The introduction of digital technology has found its proof in the education system of the leading countries that serve to an increase in the quality and effectiveness of Education. With the use of technology like this, teachers can reach a wide range of opportunities by providing information to the students through effective and interesting methods. At present, in our republic there are some elements of educational materials, plans, class Journals, online versions of student diaries, and their use is widely established. Using these technologies at the time the reader is able to access his knowledge and skills with the help of ready-made electronic resources. Digital technologies contribute to the constant monitoring of

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the activities of the reader, providing practical assistance and encouragement in case of need.

The creation of e-learning tools in Educational Sciences further enhances the possibility of using modern information and communication technologies in the teaching of these subjects. This, in turn, is the main factor in the deep acquisition of students' knowledge in these disciplines, which increases the quality and effectiveness of Education. The use of ellektron educational resources gives each cognitive recipient the opportunity to create their own set of actions and helps to introduce a competency-oriented companion in the learning process [2]. E-learning resources are defined as the means of teaching that are created using computer technology and through which they are used are speculated. There is also a similar definition to digital resources[3].

According to T. V . Kabanova opinion, the process of learning algorithmic and programming languages contributes to the formation of information competence of the individual [4]. In his article, the author expressed the structure of the information system of competency for students through a number of components (motivational, cognitive, technological, personal). We recommend that, in addition to these components, they create a small amount of practical applications, and we consider it as a practical component and consider it through a number of examples.

The use of digital technologies in all spheres of developed society is widely established, which is observed to give effective results. These technologies are also used in the education system today. And this in turn is positively assessed by the performance of tasks that traditional education has not been able to perform in such cases as individualization of the teacher, increasing the motivation of students, facilitating the activities of the teacher. The use of digital technology-based resources in the educational process has a positive impact on the science teacher in the following cases:

- to achieve the involvement of students in the educational process;
- to ensure that all students with low interest in the classroom are motivated towards positive results, taking into account the opportunities of the classroom;
- increase the level of support for students with disabilities and high abilities in a timely manner;
- teacher activism "help to overcome the points of aggravation" teacher activism;
- to create the necessary conditions for students to obtain the necessary and additional information corresponding to the subject;
- encourage the student's commitment to knowledge by creating a broad opportunity to engage independently;
- there is no need for participants to use excessive paper sources during the training process;
- incredibly convenient in terms of using;
- the teacher's process of preparing for the lessons and carrying it out is facilitated, the level of quality education control is increased;

A digital source is a systematic set of information that is aimed at achieving a specific goal, pursuing a specific result. The use of digitized educational resources has been assessed as an important factor in establishing the innovative activities of the teacher. Innovative activities of the teacher these are actions aimed at achieving high results based on his pedagogical experience and improving the quality of Education. It's no secret that innovation is a new portrayal of a form or element, which in most cases is aimed at giving a positive effect.

It is important that the resources to be created are useful in the first place and the suitability for the intended purpose. For example, a situation intended for conducting a quest game in the lower classes can be cited as an example of this. In these game, small groups (or in an individual case)

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begin to perform various tasks, moving from different addresses. Such addresses can be replaced by computers, and in them it is possible not only to ask questions, but also to check the answers and encourage action. For example, the following questions can be used when passing this game on the subject of mathematics.

a) if x>7 and y>4 are x+y>?

b) if x>8 and y>5 are x+y>?

c) if x<-7 va y<7 are x+y>?

d) add inequalities: 5>-8 and 8>5

e) if a>2 and b>5 are 3a+2b> what is x in X equal to X?

We can also use test programs created in the optional programming language when implementing this game.

The future mathematics teacher should choose the form of creation “naive-complex”, relying on his knowledge at the first stage of the creation of educational resources. We can see this on the example of small-scale programs created in the Puthon programming language.

Program Code	Program result	Aim
i=65 while i<70: print (i," ", chr(i)) i=i+1	65 A 66 B 67 C 68 D 69 E	Code to determine the desired symbol
A={1,2,3,4,5,7} B={5,6,7,8,6,7} print ("A=", A) print ("B=", B) print ("A", chr(85),"B=", A. union(B))	A= {1, 2, 3, 4, 5, 7} B= {8, 5, 6, 7} A U B= {1, 2, 3, 4, 5, 6, 7, 8}	Performance of the sum of sets
A={1,2,3,55,7,8,6} B={5,6,7,8,6,7} print ("A=", A) print ("B=", B) print ("A", chr(4240),"B=", A.intersection(B))	A= {1, 2, 3, 6, 7, 8, 55} B= {8, 5, 6, 7} A ∩ B= {8, 6, 7}	Execution of the action of the intersection of sets
A={1,2,3,4,5,7} i=4 if i in A: print (4,chr(1028),"A")	4 ∈ A	Determination of the belonging of the element

A={1,2,3,4,5,66}
B={125,6,7,348,6,7,1,2,3,4,5
}
print ("A=", A)
print ("B=", B)
if (A<=B): print
("A",chr(8838),"B")
else :print
("A",chr(8840),"B")
	A= {1, 2, 3, 4, 5, 66}
	B= {1, 2, 3, 4, 5, 6, 7, 348, 125
	A ⊄ B
		To check the matching A collection to b collection

Although such small-scale programs are very simple, they require creative co-operation in their creation, and they can be used in the process of classes in the teaching of mathematics (10 class).

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At the secondary stage, it is desirable for the student to enter the program of practical character and try to create this. In this case, it is necessary to study the possibilities of the language of programming and try to create programs that show a clear result. We can observe this situation in the example of a program that uses a system of linear equations in a feed using the Kramer method. 1-step. Configure the form (App view for the upcoming Windows operating system). In order to enter the required values (StringGrid1) and to track different cases, 5-th String Grid 1TA Edit, 4-th Button and one Memo component are placed.

2-step. As soon as the application is launched, the normal operation of the equipment and the system of commands that help the user are issued using the following procedure

```
procedure TForm27.FormCreate(Sender: Object);

begin

n:=3; StringGrid2.ColCount:=1; StringGrid2.RowCount:=n+1; StringGrid2.Cells[0,0]:='ozod hadlar';

Edit1.Text := FloatToStr(N);StringGrid1.RowCount := N+1; StringGrid2.RowCount := N+1;

StringGrid1.ColCount := N+1; StringGrid3.ColCount := N+1;StringGrid4.RowCount := N+1; StringGrid4.RowCount := N+1;StringGrid5.RowCount := N+1; StringGrid5.RowCount := N+1;

StringGrid1.Cells [0,0] := 'Матрица A';StringGrid3.Cells [0,0] := '---';

for r:= 1 to N do begin

StringGrid1.Cells [0,r] :=IntToStr(r)+ ' -row ' ;

StringGrid3.Cells [0,r] :=IntToStr(r)+ ' -row ' ;

StringGrid4.Cells [0,r] :=IntToStr(r)+ ' -row ' ;

StringGrid5.Cells [0,r] :=IntToStr(r)+ ' - row ' ;end;

for c:= 1 to N do begin

StringGrid1.Cells [c,0] :=IntToStr(c)+ ' - superior ' ;

StringGrid3.Cells [c,0] :=IntToStr(c)+ ' - superior ' ;

StringGrid4.Cells [c,0] :=IntToStr(c)+ ' - superior ' ;StringGrid5.Cells [c,0] :=IntToStr(c)+ ' - ustun ' ;

end;
```

3-step. For buttons, the following command system is given.

```
procedure TForm27.Button1Click(Sender: TObject);

begin

for c := 1 to N do for r := 1 to N do

A[c,r]:=StrToFloat(StringGrid1.Cells[r,c]);

MyProc(A,asdeter); dd:=asdeter;

Memo1.Lines.Add('asdener'+FloatToStr(asdeter));

end;

procedure TForm27.Button2Click(Sender: TObject);

begin

for r := 1 to N do for u := 1 to N do

begin StringGrid3.Cells [r,u] := StringGrid1.Cells[r,u]; end;
```

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for r := 1 to N do StringGrid3.Cells [1,r] := StringGrid2.Cells[0,r];

for c := 1 to N do for r := 1 to N do

A[c,r]:=StrToFloat(StringGrid3.Cells[r,c]); MyProc(A,asdeter);

yechim[1]:=asdeter/dd; Memo1.Lines.Add('x1='+FloatToStr(yechim[1]));

end;

Note: when creating a program, the Delphi programming environment opportunity was used and the MyPros part program was used in it. It is desirable that the procedure and the necessary variables, as well as their types, are presented in the following form at the beginning of the program.

Type ta = array[1..10,1..10] of real;

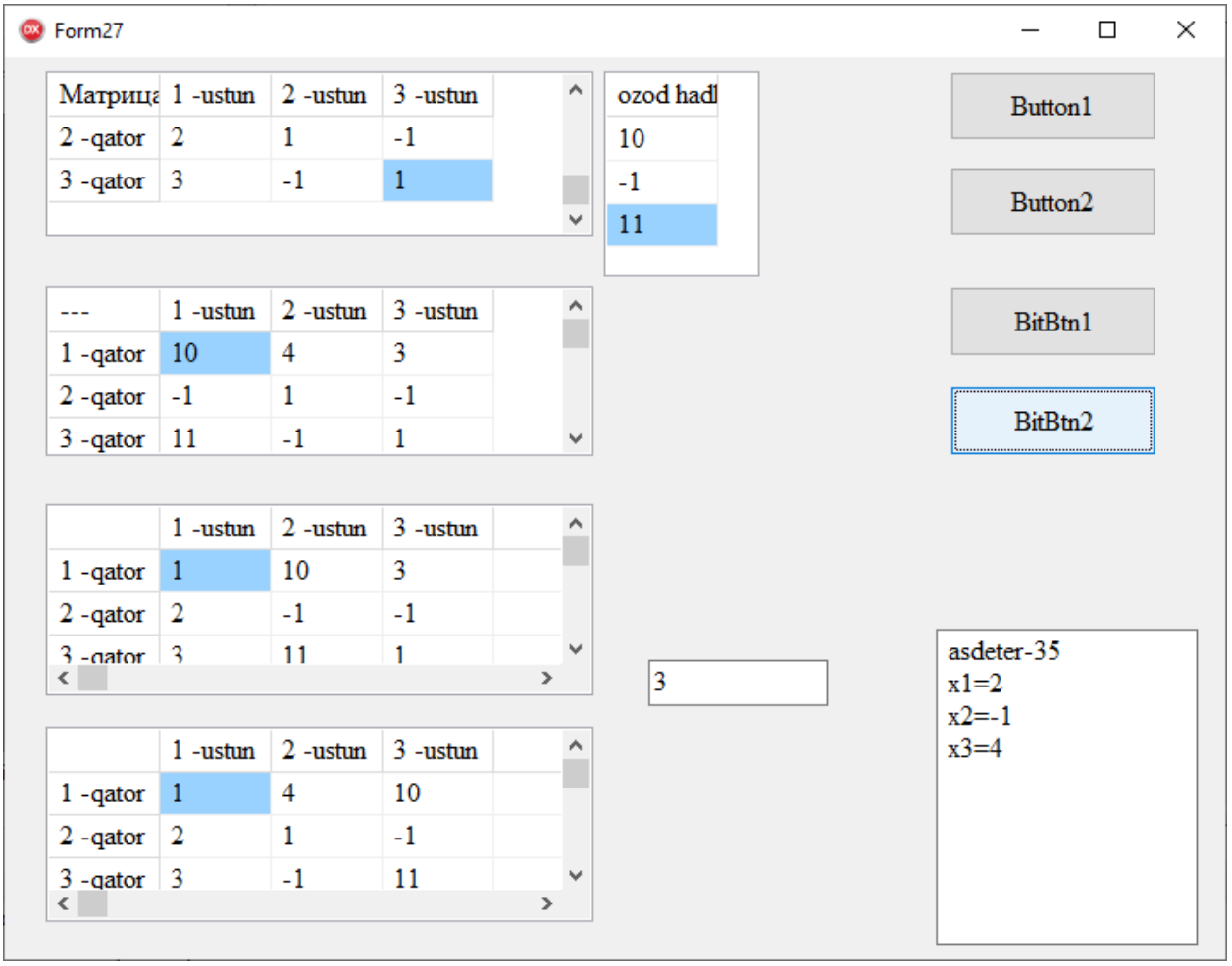
Var asdeter,dd:real; N, r, c,u: integer; yechim:array[1..3] of real; A:ta;

procedure MyProc(A: ta; var asdeter:real);

begin asdeter:=a[1,1]*a[2,2]*a[3,3]+a[1,2]*a[2,3]*a[3,1]+a[2,1]*a[3,2]*a[1,3]; asdeter:=asdeter-(a[1,3]*a[2,2]*a[3,1]+a[2,3]*a[3,2]*a[1,1]+a[2,1]*a[1,2]*a[3,3]);

end;

application result:



At the third stage, it is necessary that the student or teacher begins to determine the solution to more complex professions. For example, we can use the program C++ to solve the equation 2arctgx-x3=0 by the method of Watts as an example:

#include <iostream>

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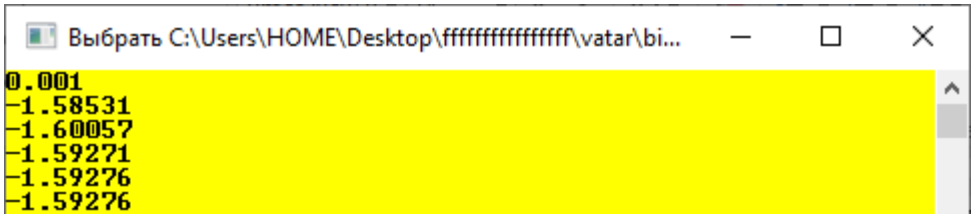
```
#include <math.h>
using namespace std;
double g (double x)
{ return(2*atan(x)-0.5*x*x*x); }
int main()
{ double a,b,eps,x;m cin>>a; cin>>b; cin>>eps;
for (int n=1; fabs(a-b)>eps;n++)
{ x=a-(g(a)*(b-a))/(g(b)-g(a)); if (g(x)*g(b)<0) {b=x;} else{a=x;}
cout<<x<<endl;}
cout<<g(x); return 0;}
```

Application result:



In conclusion, we note that the process of teaching the science of algorithms and modern programming languages should serve to create software resources that the future computer science teacher will be able to use in his future activities. Operating independently at this stage has a positive effect on the improvement of the student's systematic logical thinking process, the scope of his imagination in programming is over, and the competence of the specialist is formed.

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